

The Office Action objects to drawing Figs. 28(a) and 28(b) because these figures should be designated by a legend such as "Prior Art". A Request for Approval of Drawing Corrections requesting the Examiner's approval of red-lined proposed changes is attached. Withdrawal of the objection is respectfully requested.

Also, claim 3 is amended to recite that the conical surface of the both-end conical roller is crowned. Claim 3 now recites only a structural feature and not a process. Crowning is referred to in Fig. 2(b) (but not specifically drawn as such) and is commonly known in the art as referred to in column 11, lines 1-6 of Tanishiki (U.S. Patent No. 5,846,000).

Claims 1-3, 5, 7, 9 and 23 are rejected under 35 U.S.C. §112 second paragraph. The claims are amended to obviate the rejection. Withdrawal of the rejection is respectfully requested.

Claim 1 is rejected under 35 U.S.C. §102(b) as being anticipated by Rood (U.S. Patent No. 4,715,733). The rejection is respectfully traversed.

Claim 1 is directed to a scroll thrust bearing that has a plurality of both-end conical rollers rotatably held between a pair of parallel bearing plates. Claim 1 recites that the both-end conical rollers are composed of conical bodies having a pair of conical surfaces matched coaxially and a relation of a scroll swirl radius R and a dimension H between opposite tracks of the bearing plates is set in a relation of $1 < H/R < 5$.

The Office Action states that Rood discloses a thrust bearing arrangement in Figure 10 configured for orbital motion, the thrust bearing comprising a pair of opposing plates (20e, 22e), a track pocket (32) formed in the plates, and a plurality of both end conical rollers (24a) disposed in the track pockets of the opposing plates, and also states that referring to Figure 10, Rood illustrates the relation of the scroll swirl radius and the dimension between opposite tracks of the bearing plates is set in the relation of $1 < H/R < 5$. Applicants respectfully disagree with the position.

The structural features recited in claim 1, specifically the feature that relation of a scroll swirl radius R and a dimension H between opposite tracks of the bearing plates being set in a relation of $1 < H/R < 5$ as recited in claim 1 are obtained as a result of

various tests and studies by the applicants in order to solve the problems of the prior art.

That is, in the both-end conical rollers composing the scroll thrust bearing, setting a relation of the scroll swirl radius R and a dimension H between opposite tracks of the both bearing plates is set in $1 < H/R < 5$ (specifically, see page 14, line 4 to page 15, line 21 in the specification) has been successful in substantially extending the life of the both-end conical rollers and further substantially extending the life of the scroll thrust bearing.

More specifically, since the shape and dimension of the both-end conical rollers are designed to satisfy the above relation, with respect to the preset scroll swirl radius R of the both-end conical roller, the section curvature in the contact portion with the track of the both bearing plates on the conical surface of the both-end conical roller is as small as possible in practical range. Therefore, the surface pressure (pressure per unit area) acting on the conical surface of the both-end conical roller is as small as possible, and a sufficient durability is assured practically.

At first glance, Rood seems to illustrate in Figure 10 that the relation of the scroll swirl radius and the dimension between opposite tracks of the bearing plates is set in a relation of $1 < H/R < 5$ as recited in claim 1. However, Rood not only does not disclose the claimed invention (i.e., all of the problems of the prior art to be solved by the present invention, the structural features of the claimed invention especially a relation of the scroll swirl radius R and a dimension H between opposite tracks of the bearing plates being set in a relation of $1 < H/R < 5$, and operation and effect of the present invention), but also does not teach and suggest the claimed invention.

In other words, Rood illustrates not only the both-end conical roller in Figure 10 pointed out by the Office Action but also other various both-end conical rollers having different configurations including both-end conical roller in Figure 10 pointed out by the Office Action. Further, Rood does not describe the relation of a scroll swirl radius R and the dimension H between opposite tracks of the bearing plates concerning any both-end conical rollers as illustrated at all. This fact shows in reality that in Rood there is no awareness of the problems of the prior art to be solved by the claimed invention,

and therefore there is no realization and conception of the structural features of the claimed invention to solve the problems, too.

It is respectfully submitted that the rejection is improper because the applied art fails to teach each element of claim 1. Specifically, the applied art fails to teach a relation of a scroll swirl radius R and a dimension H between opposite tracks of the bearing plates being set in a relation of $1 < H/R < 5$. Thus, it is respectfully submitted that claim 1 is allowable over the applied art.

Withdrawal of the rejection is respectfully requested.

Claims 3, 5, 7, 9 and 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Rood as applied to claim 1 and further in view of Tanishiki. The rejection is respectfully traversed.

Tanishiki, teaches a roller bearing and assembling method for the roller bearing. The roller bearing has double-cone rollers as rolling elements. The roller bearing includes a pair of bearing swivels, a plurality of track pockets and a connector for connecting and holding the pair of bearing swivels.

As discussed above, claim 1 is allowable over Rood. Tanishiki fails to cure the deficiencies of Rood. Therefore, it is respectfully submitted that claim 1 is allowable over the combination of these references.

Claims 3, 5, 7, 9 and 23 depend from claim 1 and include all of the features of claim 1. Therefore, the dependent claims are allowable at least for the reasons claim 1 is allowable as well as for the features they recite.

Withdrawal of the rejection is respectfully requested.

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Rood as applied to claim 1 and further in view of Tsutsui et al. (U.S. Patent No. 5,752,775). The rejection is respectfully traversed.

Tsutsui et al. teaches a roller bearing. In the roller bearing, a boundary portion between a rolling surface and a rounded portion is smoothly continuous.

Claim 1 is allowable over Rood as discussed above. Further, Tsutsui et al. fails to cure the deficiencies of Rood. Therefore, claim 1, in our opinion, is allowable over the combination of these references.

Claim 2 depends from claim 1 and includes all of the features of claim 1. We propose to argue that claim 2 is allowable at least for the reasons claim 1 is allowable as well as for the features it recites.

Withdrawal of the rejection is respectfully requested.

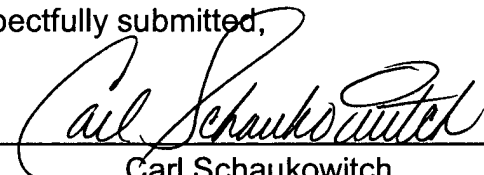
In view of the foregoing, reconsideration of the application and allowance of the pending claims are respectfully requested. Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

Should additional fees be necessary in connection with the filing of this paper or if a Petition for Extension of Time is required for timely acceptance of the same, the Commissioner is hereby authorized to charge Deposit Account No. 18-0013 for any such fees and Applicant(s) hereby petition for such extension of time.

Respectfully submitted,

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Enclosure(s): Marked-Up Version of Amended Claims
 Request for Approval of Drawing Corrections
 One (1) sheet of drawings (FIGS. 28(a) and 28(b))
 Petition for Extension of Time (three months)

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MARKED-UP VERSION OF AMENDED CLAIMS

1. (Amended) A scroll thrust bearing having a plurality of both-end conical rollers rotatably held between a pair of parallel bearing plates,

wherein said both-end conical rollers are composed of conical bodies having a pair of conical surfaces matched coaxially, and the a relation of the a scroll swirl radius (R) and the a dimension (H) between opposite tracks of the ~~both~~ bearing plates is set in a relation of $1 < H/R < 5$.

2. (Amended) The scroll thrust bearing of claim 1,

wherein said pair of conical surfaces of the both-end conical roller are bonded at the bottom, and the bonded bottom of the both conical surfaces has a junction surface including an arc section continuous to the both conical surfaces, so that the contact length in the a generator direction of the both conical surfaces to the track on the both bearing plates is ~~set to be as small as possible~~ minimized.

3. (Amended) The scroll thrust bearing of claim 1,

wherein the conical surface of the both-end conical roller is ~~processed by~~ crowning crowned.

7. (Amended) The scroll thrust bearing of claim 5,

wherein said linking means is a pair of linking pins, one linking pin fixed to ~~the both each bearing plates~~ plate, this each linking pin has having an engaging flange at the a leading end, and a swirl shaft at the an axial direction base end of the engaging flange, the engaging flange of the one linking pin of the ~~both bearing plates~~ swirls and slides relatively on the an outer surface of the swirl shaft of the other linking pin of ~~each opposite side bearing plate~~, and the ~~both~~ bearing plates are held in a relatively rotatable state in the a same tracking as the a swirl circle of the both-end conical rollers.

9. (Amended) The scroll thrust bearing of claim 5,

wherein said track pocket has an inner side of same inside diameter as the a swirl circle of the both-end conical roller, the inner sides of the opposing pair of track pockets are disposed in an eccentric state by the a portion of the radius of the swirl circle of the both-end conical roller mutually in a plane view, and the both-end conical rollers are guided and held in nearly elliptical holding holes formed by overlaying these inner sides.

23. (Amended) The scroll thrust bearing of claim 1,
wherein the pair of bearing plates have positioning parts to be engaged with the a fixed side or a swirl side positioning part of the device swirl unit to be assembled in.